

## ABSTRACT OF THE DISCLOSURE

[0041] An improved multi-voltage power supply charges individual small capacitors to different voltages. Each small capacitor is assigned to a circuit, and is charged to a voltage level sufficient for the circuit. In one embodiment, an improved switching regulator includes a multiplicity of small capacitors. The small capacitors are assigned to stimulation channels of a stimulation system. Each channel has a unique compliance voltage which the assigned small capacitors are charged to. By charging the small capacitors to the corresponding compliance voltages, versus charging a single large capacitor to the maximum compliance voltage, unnecessary power dissipation is avoided. In another embodiment, a switched capacitor power supply benefits from the present invention in the same manner as the switching regulator power supply. Further, any system requiring a plurality of different voltages may benefit from the present invention.